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ARE INTERNET-IMPLEMENTED APPLICATIONS OF BLOCK-CHAIN TECHNOLOGY PATENT-ELIGIBLE IN THE UNITED STATES?

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Many have noted that block-chain technology¹ “will change the world.”² While the block-chain technology can be implemented for any peer-to-peer network, this technology has been most effectively applied using the internet in applications such as the bitcoin. This article addresses the question of whether the internet-implemented applications of block-chain technology are patent-eligible in the United States. To answer this question, this article discusses whether the United States Constitution, the patent statutes, and federal patent cases allow a patent to be granted for the internet-implemented applications of block-chain technology. Based on the analysis of these issues, it is concluded that some, but not all, aspects of the internet-implemented applications of block-chain technology are patent-eligible.

I. UNITED STATES CONSTITUTION ALLOWS PATENT PROTECTION OF INTERNET-IMPLEMENTED APPLICATIONS OF BLOCK-CHAIN TECHNOLOGY

The United States Constitution empowers the United States Congress “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”³ Because internet-implemented applications of block-chain technology are a useful art and inventors can discover new aspects of those applications, the U.S. Constitution permits inventors to obtain exclusive rights to their inventions related to the internet-implemented applications of block-chain technology for a limited time that is the patent term.

1. Block-chain technology is also referred to as block chain technology, distributed ledger technology, shared ledger technology, and distributed ledger technology. Block-chain technology relates to a decentralized database including a chain of distributed storage blocks accessible by a network of computing nodes of a peer-to-peer network that irreversibly communicate—for example, transact—directly with each other via a communication network, such as the internet. When a new communication occurs between two or more computing nodes: the network of computing nodes validates the communication via consensus of either a sufficient number of users or preset users within the peer-to-peer network; those two or more computing nodes create a new storage block storing data associated with the new communication; and those two or more computing nodes add that storage block to the database. The chain of distributed storage blocks is referred to as a block-chain. The block-chain is a linked list built with hash pointers, wherein a hash pointer is a pointer to where some information is stored together with a cryptographic hash of that information. Each computing node in the peer-to-peer network can access the entire database, including the storage block. *See generally* ARVIND NARAYAN, ET AL., *BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES: A COMPREHENSIVE INTRODUCTION* (Princeton Univ. Press 2016).

2. *See, e.g.*, Alex Tapscott & Dan Tapscott, *Here's Why Blockchains Will Change the World*, *FORTUNE* (May 8 2016), <http://fortune.com/2016/05/08/why-blockchains-will-change-the-world/>.

3. U.S. CONST. art. I, § 8, cl. 8.

II. FEDERAL PATENT STATUTES PERMIT PATENT PROTECTION OF INTERNET-IMPLEMENTED APPLICATIONS OF BLOCK-CHAIN TECHNOLOGY

35 United States Code § 102(b) bars an inventor from getting a patent on a technology that is published or in public use more than one year prior to a filing date of a patent application.⁴ The block-chain technology has been around since decades. Various internet-implemented applications of that technology, such as the bitcoin, have been around since more than a year ago. Such internet-implemented applications of block-chain technology are therefore not patentable. However, new internet-implemented applications, as well as improvements to existing applications of the block-chain technology that have not been published or used since more than a year ago are patentable under 35 U.S.C. § 102(b).⁵

The patent-eligibility of inventions, including inventions related to block-chain technology, is captured in 35 U.S.C. § 101, which states that “[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.”⁶ There can be several aspects of internet-implemented applications of block-chain technology that an innovator can protect, including:

1. applications that use the block-chain technology over the internet, such as applications for financial data such as cryptocurrencies, public records, identification, private records, attestation, tangible and intangible assets, remittance, securities transactions, loyalty points, electronic coupon, smart contracts, escrow transactions, and third-party arbitration;⁷
2. improvements in the architecture of one or more of the following individual technologies that collectively form the block-chain technology implemented over the internet, such as: asymmetric encryption, hash functions, Merkle trees, key-value database, peer-to-peer (P2P) communication protocol, and proof of work;⁸

4. See 35 U.S.C. § 102(b) (2015).

5. See *id.*

6. 35 U.S.C. § 101 (1952).

7. James Wan, *The Blockchain Patent Landscape - What's Been Protected and What to Expect next - Part 2*, LEXOLOGY (Sept. 1, 2017), <https://www.lexology.com/library/detail.aspx?g=051b8841-1da5-44b6-bbe0-385ad6729a3d> (last visited Feb. 20, 2018).

8. *Id.* at 1.

3. improvements in methods executed by the aforementioned individual technologies, such as: (a) a method of sharing transactions and blocks as executed using the P2P communication protocol, (b) a process of validating transactions and achieving distributed consensus, which use the block-chain concepts of proof of work, proof of stake, and decentralized consensus, (c) a method of efficiently packaging transactions into blocks, using the concept of Merkle trees, (d) a method of performing hashing of at least one of blocks and transactions, and a method of obfuscating public keys, (e) a method of searching previous transactions to prevent double-spends, which uses the concept of key-value database, and (f) a method of signing transactions, which can use the technologies of digital signatures based on public and private keys, asymmetric encryption, and elliptic curve cryptography;⁹ and
4. computing systems or devices, computer program products, and articles of manufacture that are used by the end customer to execute the internet-implemented applications that implement the block-chain technology.¹⁰

Each of these aspects clearly qualify as at least a process, a machine, a manufacture, a composition of matter, or an improvement thereof, as noted in 35 U.S.C. § 101. Federal patent statutes, therefore, allow a patent to be granted for internet-implemented applications of block-chain technology.

Federal case law, however, imposes exceptions to the general patentability of the internet-implemented applications of block-chain technology, as discussed below.

III. FEDERAL CASE LAW PERMITS PATENT-ELIGIBILITY OF SOME, NOT ALL, ASPECTS OF BLOCK-CHAIN TECHNOLOGY

“The [case law] provide[s] three specific exceptions to § 101’s broad patent-eligibility principles: ‘laws of nature, physical phenomena, and abstract ideas.’”¹¹ “While these exceptions are not required by the statutory

9. *Id.* at 2.

10. *Id.*

11. *Bilski v. Kappos*, 561 U.S. 593, 601 (2010) (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980)); *see also* *Parker v. Flook*, 437 U.S. 584, 598 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972); *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948); *O’Reilly v. Morse*, 15 How. 62, 112-121 (1854); *Le Roy v. Tatham*, 14 How. 156, 175 (1853).

text, they are consistent with the notion that . . . patentable [subject matter] must be ‘new and useful.’”¹²

The internet-implemented applications of block-chain technology are neither a law of nature nor a natural phenomenon. Therefore, whether the internet-implemented applications of block-chain technology are patent eligible depends on whether the claimed concept is abstract. Recent cases have established that an abstract idea can also be patent-eligible when the claim nevertheless includes an inventive concept that ensures that the patent amounts to significantly more than a patent on the ineligible abstract idea itself.¹³ An aspect of the internet-implemented applications of block-chain technology can accordingly be patent eligible when: it is not abstract; or when abstract, it has an inventive concept.

A. *Abstract idea*

An abstract idea can be classified as one of: (a) a fundamental economic practice, (b) mathematical relationships or formulas, (c) an idea ‘of itself,’ and (d) certain methods of organizing human activity.¹⁴ Aspects of the internet-implemented applications of block-chain technology can possibly, but not necessarily, fall into any one of these classifications, which are elaborated below.

1. *Fundamental economic practice*

A fundamental economic practice is an economic practice that has been “long prevalent in our system of commerce.”¹⁵ An economic practice may be long prevalent in the system of commerce when it is “a building block of the modern economy.”¹⁶ Evidentiary sources, such as law journals and credible books, have often been considered in determining or confirming whether a particular economic practice is a building block of the modern economy.¹⁷

Fundamental economic practices can include various aspects such as: calculation of a patient’s bill,¹⁸ selecting financial instruments that maximize

12. *Bilski*, 561 U.S. at 601 (quoting 35 U.S.C. § 101).

13. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014).

14. See generally discussion *infra*.

15. *Alice*, 134 S. Ct. at 2350; *In re Salwan*, 681 F. App’x 938, 941 (Fed. Cir. 2017); *In re Chorna*, 656 F. App’x 1016, 1020 (Fed. Cir. 2016); *LendingTree, LLC v. Zillow, Inc.*, 656 F. App’x 991, 996 (Fed. Cir. 2016).

16. *Alice*, 134 S. Ct. at 2356.

17. For example, the *Alice* court looked at the following sources to determine or confirm that use of a third-party intermediary to reduce settlement risk is a building block of the modern economy: Yesha Yadav, *The Problematic Case of Clearinghouses in Complex Markets*, 101 GEO. L. J. 387, 406–412 (2013) and JOHN C HULL, RISK MANAGEMENT AND FINANCIAL INSTITUTIONS 103–104 (3d ed. 2012). *Alice*, 134 S. Ct. at 2356.

18. *Salwan*, 681 F. App’x at 941.

financial return while minimizing risk of financial loss,¹⁹ rules for conducting a wagering game,²⁰ coordinating loans,²¹ offer-based price optimization,²² exchanging financial obligations between two parties using a third-party intermediary to mitigate settlement risk,²³ creating a contractual relationship,²⁴ and hedging risk in commodity prices.²⁵

The determination of whether a claimed invention is categorized as a fundamental economic practice is independent of the computing system on which the invention is implemented.²⁶ The above-noted aspects alone would have likely been deemed abstract even if executed by internet-implemented applications of block-chain technology.

Further, entities innovating in the technical fields involving the bitcoin—which is an example of an internet-implemented application of block-chain technology—can argue that bitcoin transactions should not be characterized as fundamental economic practice, as bitcoins are a fairly recent phenomenon rather than being long prevalent in commerce. A defendant can however counter such an argument by asserting that bitcoins should be deemed to be long prevalent in commerce because a bitcoin is “a building block of the modern economy.”²⁷ The Federal Courts have not yet decided on whether bitcoin transactions constitute a fundamental economic practice to adjudicate disputes regarding patent-eligibility, and so it will be interesting to see how the Courts resolve this issue.

2. Mathematical relationships or formulas

Mathematical relationships or formulas can include the following aspects: calculating and comparing regions in space;²⁸ managing a stable value protected life insurance policy by performing calculations and manipulating the results;²⁹ a mathematical formula for hedging;³⁰ an algorithm for calculating parameters indicating existence of an abnormal condition;³¹

19. *Chorna*, 656 F. App'x at 1020.

20. *In re Smith*, 815 F.3d 816, 818 (Fed. Cir. 2016).

21. *LendingTree*, 656 F. App'x at 996.

22. *OIP Tech., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1362 (Fed. Cir. 2015).

23. *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2356 (2014).

24. *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1353–54 (Fed. Cir. 2014).

25. *In re Bilski*, 545 F.3d 943, 996 (Fed. Cir. 2008).

26. The claims in *Chorna*, *In re Smith*, *LendingTree*, *OIP Technologies*, *Alice*, *buySAFE*, and *In re Bilski* were deemed as mathematical concepts notwithstanding the computing system on which the claimed invention is implemented. See *supra* notes 19–25.

27. *Alice*, 134 S. Ct. at 2356.

28. *Coffelt v. NVIDIA Corp.*, 680 F. App'x 1010, 1011 (Fed. Cir. 2017).

29. *Bancorp Servs. v. Sun Life*, 687 F.3d 1266, 1280 (Fed. Cir. 2012).

30. *Bilski*, 545 F.3d at 949, 965–66.

31. *In re Grams*, 888 F.2d 835, 837 (Fed. Cir. 1989).

calculating the difference between local and average data values;³² an algorithm for determining optimum number of visits by a business representative to a client within a certain time period;³³ and an algorithm for converting binary coded decimal to pure binary.³⁴

The determination of whether a claimed invention is categorized as a mathematical relationship or formula is independent of the system on which the invention is implemented.³⁵ The aforementioned mathematical aspects would likely have, accordingly, been deemed abstract even when implemented by internet-implemented applications of block-chain technology.

Further, the block-chain technology includes various individual technologies, such as asymmetric encryption, hash functions, Merkle trees, and proof of work, all of which may involve mathematical concepts.³⁶ Such mathematical concepts may be viewed as mathematical relationships or formulas, and, thus, may be deemed abstract. However, other aspects of these technologies may not be characterized as mathematical relationships or formulas, and therefore would not necessarily be considered abstract.

It may be noted that every patent claim including a mathematical formula is not necessarily abstract. Where a process contains a mathematical formula or algorithm, one must look to the claim as a whole, not only to determine whether the claim precludes others from either using the mathematical formula or algorithm or from performing a functionality, but also to determine if it is patentable.³⁷

3. Idea 'of itself'

An idea of itself is a “mental process”³⁸ that lies “[with]in the mind of the inventor.”³⁹ An idea of itself can encompass various aspects that can be performed within a human mind, such as: collecting financial information of potential borrowers, analyzing the information, and displaying certain results

32. *In re Abele*, 684 F.2d 902, 908–10 (C.C.P.A. 1982).

33. *In re Maucorps*, 609 F.2d 481, 485–86 (C.C.P.A. 1979).

34. *Gottschalk v. Benson*, 409 U.S. 63, 65 (1972).

35. The claims in *Coffelt, Bancorp Servs.*, *In re Bilski*, *In re Grams*, *In re Abele*, *In re Maucorps*, and *Gottschalk* were deemed as fundamental economic practices without regard to the system on which the claimed invention is implemented.

36. James Wan, *The Blockchain Patent Landscape - What's Been Protected and What to Expect next - Part 2*, LEXOLOGY (Sept. 1, 2017), <https://www.lexology.com/library/detail.aspx?g=051b8841-1da5-44b6-bbe0-385ad6729a3d> (last visited Feb. 20, 2018).

37. The U.S. Supreme Court held in *Diamond v. Diehr*, 450 U.S. 175 (1981), that a particular method of molding and curing rubber that happens to include the formula or algorithm is patent-eligible because the claim precludes others from performing a functionality of molding and curing rubber rather than precluding others from using the mathematical formula or algorithm. *Id.* at 180.

38. *Gottschalk*, 409 U.S. at 67.

39. *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 506 (1874).

of the collection and analysis;⁴⁰ anonymous loan shopping;⁴¹ providing out-of-region access to regional broadcast content;⁴² collecting, storing, and analyzing data;⁴³ assigning hair designs to balance head shape;⁴⁴ generating a second menu from a first menu and sending the second menu to another location;⁴⁵ migration of settings from one computer to another;⁴⁶ collecting and analyzing information to detect misuse and then notifying a user when misuse is detected;⁴⁷ delivering user-selected media content to portable devices;⁴⁸ collecting information, analyzing it, and displaying certain results of the collection and analysis;⁴⁹ retaining information in navigation of online forms;⁵⁰ determining a price, using organizational and product group hierarchies;⁵¹ displaying an advertisement in exchange for access to copyrighted media;⁵² organizing data through mathematical correlations;⁵³ comparing new and stored information and using rules to identify options;⁵⁴ data collection, recognition and storage;⁵⁵ comparing data to determine a risk level;⁵⁶ obtaining information about transactions and then using that information in some undefined manner to determine if the transaction is valid;⁵⁷ obtaining undefined manner to determine if the transaction is valid, obtaining of intangible data, and comparing that data to organize it;⁵⁸ and collecting and comparing known information.⁵⁹

When claimed subject matter does not recite the tangible aspects of the internet-implemented applications of block-chain technology and can lie within the mind of the inventor, the claimed invention is likely to be

40. Clarilogic, Inc. v. Formfree Holdings Corp., 681 F. App'x 950, 954 (Fed. Cir. 2017).
41. Mortg. Grader, Inc. v. First Choice Loan Servs. Inc., 811 F.3d 1314, 1324 (Fed. Cir. 2016).
42. Affinity Labs of Tex. v. DIRECTV, LLC, 838 F.3d 1253, 1258 (Fed. Cir. 2016).
43. TDE Petrol. Data Sols., Inc. v. AKM Enter., 657 F. App'x 991, 993 (Fed. Cir. 2016).
44. See *In re Brown*, 645 F. App'x 1014, 1016 (Fed. Cir. 2016).
45. Apple, Inc. v. Ameranth, Inc., 842 F.3d 1229, 1240 (Fed. Cir. 2016).
46. Tranxition, Inc. v. Lenovo (United States) Inc., 664 F. App'x 968, 969–72 (Fed. Cir. 2016).
47. FairWarning IP, LLC v. Iatric Sys., 839 F.3d 1089, 1094–95 (Fed. Cir. 2016).
48. Affinity Labs of Tex. v. DIRECTV, LLC, 838 F.3d 1253, 1258–61 (Fed. Cir. 2016).
49. Elec. Power Grp., LLC, v. Alstom S.A., 830 F.3d 1350, 1353 (Fed. Cir. 2016).
50. Internet Patents Corp. v. Active Network, Inc., 790 F.3d 1343, 1345–48 (Fed. Cir. 2015).
51. Versata Dev. Grp. v. SAP America, Inc., 793 F.3d 1306, 1333–34 (Fed. Cir. 2015).
52. Ultramercial, Inc. v. Hulu, LLC, 772 F.3d 709, 714–15 (Fed. Cir. 2014).
53. Digitech Image Techs., LLC v. Electronics for Imaging, Inc., 758 F.3d 1344, 1350 (Fed. Cir. 2014).
54. SmartGene, Inc. v. Advanced Biological Labs., 555 Fed. App'x. 950, 955 (Fed. Cir. 2014).
55. Content Extraction & Transmission LLC v. Wells Fargo Bank, N.A., 776 F.3d 1343, 1347 (Fed. Cir. 2014).
56. PerkinElmer, Inc. v. Intema Ltd., 496 F. App'x 65, 70 (Fed. Cir. 2012).
57. CyberSource Corp. v. Retail Decisions, Inc., 654 F.3d 1366, 1376–77 (Fed. Cir. 2011).
58. *Id.* at 1370.
59. Classen Immunotherapies Inc. v. Biogen IDEC, 659 F.3d 1057, 1067 (Fed. Cir. 2011).

categorized as an idea of itself.⁶⁰ However, when the claims recite the tangible aspects—for example, the underlying architecture—of the internet-implemented applications of block-chain technology, it can be argued that such aspects are not a mental process within the mind of the user, and therefore the claims are not an idea of itself and thus not abstract.

4. *Certain methods of organizing human activity*

Methods of organizing human activity can include various aspects such as: collecting, displaying, and manipulating extensible markup language (XML) data;⁶¹ filtering content;⁶² cataloging labor data;⁶³ receiving, screening for viruses, and distributing of e-mail;⁶⁴ classifying and storing digital images in an organized manner;⁶⁵ generating menus on a computer;⁶⁶ budgeting;⁶⁷ testing operators of any kind of moving equipment for any kind of physical or mental impairment;⁶⁸ creating a contractual relationship;⁶⁹ managing a game of bingo;⁷⁰ mitigating settlement risk;⁷¹ using advertising as an exchange or currency;⁷² generating rule-based tasks for processing an

60. See, e.g., *Clarilogic, Inc. v. Formfree Holdings Corp.*, 681 F. App'x 950, 954 (Fed. Cir. 2017); see also *Mortg. Grader, Inc. v. First Choice Loan Servs. Inc.*, 811 F.3d 1314, 1324 (Fed. Cir. 2016); *Affinity Labs of Tex. v. DIRECTV, LLC*, 838 F.3d 1253, 1258 (Fed. Cir. 2016); *TDE Petrol. Data Sols., Inc. v. AKM Enter.*, 657 F. App'x 991, 993 (Fed. Cir. 2016); *In re Brown*, 645 F. App'x at 1016; *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1240 (Fed. Cir. 2016); *Tranxition, Inc. v. Lenovo (United States) Inc.*, 664 F. App'x 968, 969–72 (Fed. Cir. 2016); *FairWarning IP, LLC v. Iatric Sys.*, 839 F.3d 1089, 1094–95 (Fed. Cir. 2016); *Affinity Labs of Tex. v. DIRECTV, LLC*, 838 F.3d 1253, 1258–61 (Fed. Cir. 2016); *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016); *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1345–48 (Fed. Cir. 2015); *Versata Dev. Grp. v. SAP America, Inc.*, 793 F.3d 1306, 1333–34 (Fed. Cir. 2015); *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 714–15 (Fed. Cir. 2014); *Digitech Image Techs., LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1350 (Fed. Cir. 2014); *SmartGene, Inc. v. Advanced Biological Labs.*, 555 Fed. App'x 950, 955 (Fed. Cir. 2014); *Content Extraction & Transmission LLC v. Wells Fargo Bank, N.A.*, 776 F.3d 1343, 1347 (Fed. Cir. 2014); *PerkinElmer, Inc.*, 496 F. App'x at 70; *CyberSource Corp.*, 654 F.3d at 1376–77; *Clas-sen Immunotherapies Inc.*, 659 F.3d at 1067.

61. *Intellectual Ventures I LLC v. Capital One Fin. Corp.*, 850 F.3d 1332, 1341 (Fed. Cir. 2017).

62. *Bascom Glob. Internet Servs. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016).

63. *Shortridge v. Found. Constr. Payroll Serv., LLC*, 655 F. App'x 848 (Fed. Cir. 2016).

64. *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307 (Fed. Cir. 2016).

65. *In re TLI Communs. LLC Patent Litig.*, 823 F.3d 607 (Fed. Cir. 2016).

66. *Ameranth, Inc.*, 842 F.3d at 1240.

67. See *Intellectual Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363, 1368 (Fed. Cir. 2015).

68. See generally *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App'x 914 (Fed. Cir. 2015).

69. *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1353–54 (Fed. Cir. 2014).

70. See generally *Planet Bingo, LLC v. VKGS LLC*, 576 F. App'x 1005 (Fed. Cir. 2014).

71. *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014).

72. *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 714–15 (Fed. Cir. 2014).

insurance claim;⁷³ managing an insurance policy;⁷⁴ processing loan information;⁷⁵ tax-free investing;⁷⁶ structuring a sales force or marketing company;⁷⁷ arbitration;⁷⁸ hedging;⁷⁹ and using an algorithm for determining the optimal number of visits by a business representative to a client.⁸⁰

The determination of whether a claimed invention is categorized as a method of organizing human activity is independent of the system on which the invention is implemented.⁸¹ The aforementioned mathematical aspects would have, for this reason, likely been deemed to be a method of organizing human activity, and thus abstract, even when implemented by internet-implemented applications of block-chain technology.

B. Idea that is not abstract

While the courts have deemed the above ideas as abstract, there are several aspects that may not be abstract. For example, the following ideas—that are applicable in the internet space—have been deemed not abstract and therefore patent-eligible: a particular manner of summarizing and presenting limited data on a graphical user interface having a small screen;⁸² an improved computer memory system;⁸³ self-referential data table⁸⁴ that stores data; and rules for lip sync and facial expression animation⁸⁵—have not been deemed abstract. The rationales because of which the Federal Circuit deemed these ideas as not abstract are discussed below. These rationales are

73. See generally *Accenture Glob. Servs. v. Guidewire Software, Inc.*, 728 F.3d 1336 (Fed. Cir. 2013).

74. *Bancorp Servs. v. Sun Life*, 687 F.3d 1266, 1280–81 (Fed. Cir. 2012).

75. See generally *DealerTrack, Inc. v. Huber*, 674 F.3d 1315 (Fed. Cir. 2012).

76. See generally *Fort Props., Inc. v. Am. Master Lease LLC*, 671 F.3d 1317 (Fed. Cir. 2012).

77. See generally *In re Ferguson*, 558 F.3d 1359 (Fed. Cir. 2009).

78. See generally *In re Comiskey*, 554 F.3d 967 (Fed. Cir. 2009).

79. See *In re Bilski*, 545 F.3d 943, 965–66 (Fed. Cir. 2008).

80. *In re Maucorps*, 609 F.2d 481, 485–86 (C.C.P.A. 1979).

81. See, e.g., *Intellectual Ventures I LLC v. Capital One Bank (USA)*, 792 F.3d 1363, 1368 (Fed. Cir. 2015); *Bascom Glob. Internet Servs. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016); *Shorridge v. Found. Constr. Payroll Serv., LLC*, 655 F. App'x 848 (Fed. Cir. 2016); *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307 (Fed. Cir. 2016); *In re TLI Communs. LLC Patent Litig.*, 823 F.3d 607 (Fed. Cir. 2016); *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1240 (Fed. Cir. 2016); *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App'x 914 (Fed. Cir. 2015); *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350 (Fed. Cir. 2014); *Planet Bingo, LLC v. VKGS LLC*, 576 F. App'x 1005 (Fed. Cir. 2014); *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014); *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 714–15 (Fed. Cir. 2014); *Accenture Glob. Servs. v. Guidewire Software, Inc.*, 728 F.3d 1336 (Fed. Cir. 2013); *Bancorp Servs. v. Sun Life*, 687 F.3d 1266 (Fed. Cir. 2012); *DealerTrack, Inc. v. Huber*, 674 F.3d 1315 (Fed. Cir. 2012); *Fort Props., Inc.*, 671 F.3d 1317; *In re Ferguson*, 558 F.3d 1359; *In re Comiskey*, 554 F.3d 967; *Bilski*, 545 F.3d 593; *Maucorps*, 609 F.2d 481.

82. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1362 (Fed. Cir. 2018).

83. *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253 (Fed. Cir. 2017).

84. *Enfish LLC v. Microsoft Corp.*, 822 F.3d 1327, 1332 (Fed. Cir. 2016).

85. *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016).

discussed here to aid entities that execute internet-implemented applications of block-chain technology in identifying specific aspects of their technologies that the appellate federal courts have favored with regard to patent-eligibility.

The Federal Circuit ruled in *Core Wireless v. LG Electronics*⁸⁶ that claims 8 and 9 of U.S. Patent No. 8,713,476 and claims 11 and 13 of U.S. Patent No. 8,434,020, which “are directed to an improvement in the functioning of computers, particularly those with small screens,”⁸⁷ are not abstract. For a quick reference, dependent claims 8 and 9 of U.S. Patent No. 8,713,476, as well as independent claim 1 from which those claims 8 and 9 depend, are presented below. The Court deemed the claimed subject matter to be an improvement in the functionality of computers because “these claims are directed to a particular manner of summarizing and presenting [limited] information in [small screens of] electronic devices,”⁸⁸ which improves the “speed of a user’s navigation through various views and windows.”⁸⁹

Claims 1, 8 and 9 of U.S. Patent No. 8,713,476, which was at dispute in *Core Wireless*:

1. A computing device comprising a display screen, the computing device being configured to display on the screen a menu listing one or more applications, and additionally being configured to display on the screen an application summary that can be reached directly from the menu, wherein the application summary displays a limited list of data offered within the one or more applications, each of the data in the list being selectable to launch the respective application and enable the selected data to be seen within the respective application, and wherein the application summary is displayed while the one or more applications are in an un-launched state.

8. The computing device of claim 1 in which the summary further displays a limited list of functions offered in the one or more applications.

86. 880 F.3d 1356 (Fed. Cir. 2018).

87. *Id.* at 1363.

88. *Id.* at 1362.

89. *Id.* at 1363.

9. The computing device of claim 1, being a mobile telephone.⁹⁰

It appears that the courts are yet to adjudicate the abstractness of internet-implemented applications of block-chain technology. However, patentees of block-chain technology can rely on the rationale in *Core Wireless* to argue that internet-implemented applications of block-chain technology are not abstract because block-chain technology permits an improvement in the functionality of a computer. The block-chain technology improves the functionality of a computer because it enables, among other advantages it provides over functionality of a generic computer, immutability and permanence of data, removal of intermediaries due to decentralized architecture, increase in computational speed, and cryptographic security of data. Additionally, it is common knowledge that internet-implemented applications are often accessed on small screens of electronic devices, such as smart phones, tablet computers and phablet computers. Patentees of such internet applications, when displaying limited data in a particular effective manner, can argue that such display improves the functionality of the computer because it improves the “speed of a user’s navigation through various views and windows.”⁹¹

In *Visual Memory v. NVIDIA*,⁹² the Federal Circuit held that the claims, one of which is reproduced below, is not abstract because the claimed implementation is “an improvement to computer memory systems.”⁹³ Despite the below-reproduced claim being directed to the “use of conventional computer components,”⁹⁴ the claim was deemed an improvement to computer memory systems because the claimed implementation can “achieve or exceed the performance of a system utilizing a cache many times larger than the cumulative size of the subject caches,”⁹⁵ and “speed[] up access to main memory . . . [by] reducing access time.”⁹⁶

Claim 1 of U.S. Patent No. 5,953,740, which was at dispute in *Visual Memory*:

A computer memory system connectable to a processor
and having one or more programmable operational

90. U.S. Patent No. 8,713,476 (issued April 29, 2014).

91. *Core Wireless Licensing S.A.R.L.*, 880 F.3d at 1363.

92. 867 F.3d 1253 (Fed. Cir. 2017).

93. *Id.* at 1255.

94. *Id.* at 1262.

95. *Id.* at 1255–56.

96. *Id.* at 1256.

characteristics, said characteristics being defined through configuration by said computer based on the type of said processor, wherein said system is connectable to said processor by a bus, said system comprising:

a main memory connected to said bus; and
a cache connected to said bus;

wherein a programmable operational characteristic of said system determines a type of data stored by said cache.⁹⁷

Patent practitioners advocating for patent-eligibility of an internet-implemented application of block-chain technology can rely on *Visual Memory* to argue that improvements offered by the block-chain technology⁹⁸ allow “an improvement in the functioning of computers.”⁹⁹ Such reliance on *Visual Memory* is likely to be more effective when the claim is focused on at least some hardware aspects of the block-chain technology that implement the internet applications, as the above-noted patent-eligible claim in *Visual Memory* was directed to a computer memory system.

Further, the Federal Circuit ruled in *Enfish v. Microsoft*¹⁰⁰ that the disputed claims, one of which is reproduced below, were construed as being directed to creating a self-referential table, are not abstract. A self-referential table is a table where the column definitions are stored in rows, thereby enabling: faster search of data stored in the table, more efficient storage of data other than structured text in the table, no requirement to model each thing in the database as a separate table, and thus the ability to be configured on-the-fly.¹⁰¹ The Court ruled that the claims of that patent are not abstract because the claims are directed to a particular “table . . . [which] is a specific type of data structure designed to improve the way a computer stores and retrieves data in memory,”¹⁰² thereby the claims being “directed to a specific improvement to the way computers operate.”¹⁰³

Claim 17 of U.S. Patent No. 6,151,604, which was at dispute in *Enfish*:

97. U.S. Patent No. 5,953,740 (issued Sept. 14, 1999).

98. Improvements in block-chain technology can include, among other things, immutability and permanence of data, removal of intermediaries due to decentralized architecture, increase in computational speed, and cryptographic security of data, as also noted above.

99. *Visual Memory*, 867 F.3d at 1363.

100. 822 F.3d 1327, 1327 (Fed. Cir. 2016).

101. *Id.* at 1330–33, 1337.

102. *Id.* at 1339.

103. *Id.* at 1336.

A data storage and retrieval system for a computer memory, comprising:
 means for configuring said memory according to a logical table, said logical table including:
 a plurality of logical rows, each said logical row including an object identification number (OID) to identify each said logical row, each said logical row corresponding to a record of information;
 a plurality of logical columns intersecting said plurality of logical rows to define a plurality of logical cells, each said logical column including an OID to identify each said logical column; and
 means for indexing data stored in said table.¹⁰⁴

Applying *Enfish*, block-chain patentees can argue that their system, which includes an internet-enabled block-chain, is not abstract because it is a specific type of data structure designed to improve the way a system stores, tracks or processes data, thereby the claims being “directed to a specific improvement to the way [the block-chain] operate[s].”¹⁰⁵

In *McRO v. Bandai Namco Games*,¹⁰⁶ the Federal Circuit ruled that the claims, one of which is presented below, in the disputed patent were not abstract. The patent at issue in *McRO* is directed to automatic three-dimensional (3D) lip-synchronization for animated characters. While prior art lip-synchronization required manually synchronizing an animated character’s lips and facial expressions to specific phonemes, the claims at dispute in the *McRO* patent are directed to rules for automating that process. The Federal Circuit held that the *McRO* claims were not abstract because: (1) they describe rules, which are the means¹⁰⁷ to attain a technologically improved result of expediting prior art methods in which human animators manually set the morph weights at specific times (keyframe), as in that patent a computer uses mathematical rules to generate continuous transitions of intermediate frames between those keyframes,¹⁰⁸ and (2) those means (*i.e.*, rules) are sufficiently limited to prevent a monopoly.¹⁰⁹

104. U.S. Patent No. 6,151,604 (issued Nov. 21, 2000).

105. *Visual Memory*, F.3d. at 1336.

106. 837 F.3d 1299, 1309 (Fed. Cir. 2016).

107. *Id.* at 1314–15.

108. *Id.* at 1314.

109. *Id.* at 1315–16.

Claim 1 of U.S. Patent No. 6,307,576, which was at dispute in *McRO*:

A method for automatically animating lip synchronization and facial expression of three-dimensional characters comprising:

obtaining a first set of rules that define output morph weight set stream as a function of phoneme sequence and time of said phoneme sequence;

obtaining a timed data file of phonemes having a plurality of sub-sequences;

generating an intermediate stream of output morph weight sets and a plurality of transition parameters between two adjacent morph weight sets by evaluating said plurality of sub-sequences against said first set of rules;

generating a final stream of output morph weight sets at a desired frame rate from said intermediate stream of output morph weight sets and said plurality of transition parameters; and

applying said final stream of output morph weight sets to a sequence of animated characters to produce lip synchronization and facial expression control of said animated characters.¹¹⁰

Innovators of internet-implemented applications of block-chain technology can argue, using *McRo*, that internet-implemented applications of block-chain technology are not abstract because: (1) they are the means¹¹¹ to attain a technologically improved result of more securely storing, tracking or processing data, and (2) they are sufficiently limited to prevent a monopoly¹¹² because alternate systems—such as a centralized system rather than a decentralized block-chain technology over the internet—can instead be used to perform storing, tracking or processing of data.

C. Significantly more than a patent directed to abstract idea

In the following aspects, the courts have held that even though the claimed concept is abstract, the claim recites an inventive concept and thus the claim as a whole amounts to significantly more than the recited judicial

110. U.S. Patent No. 6,307,576 (issued Oct. 23, 2001).

111. *McRo, Inc.*, 837 F.3d at 1314–15.

112. *Id.* at 1315–16.

exception: field enhancement in a distributed computer network;¹¹³ filtering Internet content;¹¹⁴ matching website’s “look and feel”;¹¹⁵ and digital image processing.¹¹⁶ The reasons for patent-eligibility of these concepts are discussed below to aid entities innovating in internet-implemented applications of block-chain technology.

In *Amdocs v. Openet Telecom*,¹¹⁷ the Federal Circuit held that the claims, one of which is reproduced below, of four patents at issue included limitations sufficient to ensure that each of those patents amount to significantly more than a patent upon the abstract concept itself.¹¹⁸ The claims in those four patents are directed to enhancing records indicating computer network usage so that customers of the computer network can be billed accurately.¹¹⁹ The network usage records are enhanced by using a distributed architecture having: devices distributed across the computer network to aggregate usage information, and a central location where the data records on the distributed devices can be accessed.¹²⁰ This allows network usage data to reside close to the information sources, thereby reducing congestion in network bottlenecks, while still allowing data to be accessible from a central location.¹²¹ The Federal Circuit deemed the claims to be significantly more than abstract because they “entail[] an unconventional solution (enhancing data in a distributed fashion) to a technological problem (massive record flows which previously required massive databases).”¹²²

Claim 1 of U.S. Patent No. 7,631,065, which was at issue in *Amdocs*:

A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:
computer code for receiving from a first source a first network accounting record;

113. See, e.g., *Amdocs (Isr.) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1298–1301 (Fed. Cir. 2016).

114. See *Bascom Glob. Internet Servs. v. AT&T Mobility LLC*, 827 F.3d 1341, 1343 (Fed. Cir. 2016).

115. *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1249 (Fed. Cir. 2014).

116. *Res. Corp. Techs. v. Microsoft Corp.*, 627 F.3d 859, 862 (Fed. Cir. 2010).

117. *Amdocs*, 841 F.3d at 1313.

118. *Id.* at 1303.

119. *Id.* at 1291.

120. *Id.* at 1291–92.

121. *Id.*

122. *Id.* at 1300–01.

computer code for correlating the first network accounting record with accounting information available from a second source; and
 computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.¹²³

The patentees of internet applications using block-chain technology can rely on *Amdocs* to argue that such internet applications are significantly more than an abstract concept because they “entail[] an unconventional solution . . . to a technological problem [of not being able to securely store, track or process data].”¹²⁴

The Federal Circuit also held the claims, one of which is produced below, of the patent at issue in *Bascom v. AT&T*¹²⁵ as being significantly more than abstract. The *Bascom* patent describes an internet filtering tool, where a remote internet service provider (ISP) server “receives a request to access a website, associates the request with a particular user, . . . applies the filtering mechanism associated with the particular user to the requested website[,] . . . [and] returns either the content of the website to the user, or a message to the user indicating that the request was denied.”¹²⁶ The specification of that patent describes this filtering tool as an improvement over prior art filters because “no one had previously provided customized filters at a remote server.”¹²⁷ The Federal Circuit deemed that claims in the disputed patent constituted significantly more than an abstract concept because even though “[f]iltering content on the Internet was already a known concept, . . . the patent describes how its particular arrangement of elements is a technical improvement over prior art ways of filtering such content.”¹²⁸

Claim 1 of U.S. Patent No. 5,987,606, which was at issue in *Bascom*:

A content filtering system for filtering content retrieved from an Internet computer network by individual

123. U.S. Patent No. 7,631,065 (issued Dec. 8, 2009).

124. *Amdocs*, 841 F.3d at 1300–01.

125. See *Bascom Glob. Internet Servs. v. AT&T Mobility LLC*, 827 F.3d 1341, 1350 (Fed. Cir. 2016).

126. *Id.* at 1345.

127. *Id.*

128. *Id.* at 1350.

controlled access network accounts, said filtering system comprising:

a local client computer generating network access requests for said individual controlled access network accounts; at least one filtering scheme;

a plurality of sets of logical filtering elements; and

a remote ISP server coupled to said client computer and said Internet computer network, said ISP server associating each said network account to at least one filtering scheme and at least one set of filtering elements, said ISP server further receiving said network access requests from said client computer and executing said associated filtering scheme utilizing said associated set of logical filtering elements.¹²⁹

The patentees of internet applications using block-chain technology can rely on *Amdocs* to argue that those applications are significantly more than an abstract concept because even though “[storing, tracking or processing of data] on the Internet was already a known concept, . . . the . . . particular arrangement of [their computing system with respect to a block-chain executed on the internet] is a technical improvement over prior art ways of [storing, tracking or processing of] such content.”¹³⁰

Further, the Federal Circuit held in *DDR Holdings v. Hotels.com*¹³¹ that the claims at issue, one of which is presented below, were significantly more than abstract. In this case, the disputed patent describes an e-commerce syndication system for generating a composite web page that combines selected visual elements of a host website with content of a third-party merchant so that the host website can prevent the problem of losing its visitors to the third-party merchant.¹³² The composite web page thus allows visitors to stay on the original webpage while also being able to buy the advertised product.¹³³ The Federal Circuit ruled that the claimed generation of such a composite webpage is significantly more than abstract because the composite webpage addresses the Internet-centric problem of losing customers from the host website in a manner that is neither routine nor conventional use of the Internet.¹³⁴

129. U.S. Patent No. 5,987,606 (issued Nov. 16, 1999).

130. *Bascom Glob. Internet Servs.*, 827 F.3d at 1350.

131. See *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014).

132. *Id.* at 1257–58.

133. *Id.* at 1248–50.

134. *Id.* at 1258.

Claim 19 of U.S. Patent No. 7,818,399, claims of which were disputed in *DDR*:

A system useful in an outsource provider serving web pages offering commercial opportunities, the system comprising:

(a) a computer store containing data, for each of a plurality of first web pages, defining a plurality of visually perceptible elements, which visually perceptible elements correspond to the plurality of first web pages;

(i) wherein each of the first web pages belongs to one of a plurality of web page owners;

(ii) wherein each of the first web pages displays at least one active link associated with a commerce object associated with a buying opportunity of a selected one of a plurality of merchants; and

(iii) wherein the selected merchant, the outsource provider, and the owner of the first web page displaying the associated link are each third parties with respect to one other;

(b) a computer server at the outsource provider, which computer server is coupled to the computer store and programmed to:

(i) receive from the web browser of a computer user a signal indicating activation of one of the links displayed by one of the first web pages;

(ii) automatically identify as the source page the one of the first web pages on which the link has been activated;

(iii) in response to identification of the source page, automatically retrieve the stored data corresponding to the source page; and

(iv) using the data retrieved, automatically generate and transmit to the web browser a second web page that displays: (A) information associated with the commerce object associated with the link that has been activated, and (B) the plurality of visually perceptible elements visually corresponding to the source page.¹³⁵

135. U.S. Patent No. 7,818,399 (issued Oct. 19, 2010).

The patentees of internet applications using block-chain technology can rely on *DDR* to argue that their internet application addresses the Internet-centric problems of data security and reliability by using a block-chain technology, and the unique technical manner in which such an application is executed is neither routine nor conventional use of the Internet.¹³⁶ As per the points discussed above, federal case law permits patent-eligibility of some, not all, aspects of the block-chain.

As a slight deviation from the main scope of this article, entities creating internet-implemented applications of block-chain technologies can consider protecting patent-ineligible aspects of their technologies via trade secrets, in view of the following. Trade secrets have the benefit that they do not expire as opposed to patents, which have a fixed term. For such trade secret protection, those entities must make reasonable efforts of maintaining secrecy of the patent-ineligible aspects, and be able to prove that the trade secret derives commercial value from not being generally known or readily ascertainable by others.¹³⁷ Additionally, if a currently patent-ineligible concept were to become patent-eligible in the future and another entity is then granted a patent on an aspect of the internet-implemented application of block-chain technology that an entity maintained as a trade secret, 35 U.S.C. § 273¹³⁸ provides those trade secret users a defense to a possible infringement suit by those patentees when the trade secret has been in commercial use more than one year prior to the effective filing date of the patent.

CONCLUSION

The United States Constitution at Article 1, Section 8, Clause 8 permits inventors of internet-implemented applications of block-chain technology to obtain exclusive rights to their inventions for a limited time that is the patent term. Additionally, the United States Code, more specifically 35 U.S.C. §

136. *DDR Holdings, LLC*, 773 F.3d at 1258.

137. See Uniform Trade Secrets Act § 1(4), 90 U.S.C. § 1839(4) (1985); see also RESTATEMENT (FIRST) OF TORTS § 757 (AM. LAW INST. 1939); RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 39 (AM. LAW INST. 1995).

138. 35 U.S.C. § 273 (a): In General—A person shall be entitled to a defense under section 282(b) with respect to subject matter consisting of a process, or consisting of a machine, manufacture, or composition of matter used in a manufacturing or other commercial process, that would otherwise infringe a claimed invention being asserted against the person if—

(1) such person, acting in good faith, commercially used the subject matter in the United States, either in connection with an internal commercial use or an actual arm's length sale or other arm's length commercial transfer of a useful end result of such commercial use; and

(2) such commercial use occurred at least 1 year before the earlier of either—

(A) the effective filing date of the claimed invention; or

(B) the date on which the claimed invention was disclosed to the public in a manner that qualified for the exception from prior art under section 102(b).

101, also allows inventions related to internet-implemented applications of block-chain technology to be patent-eligible. The federal case law narrows the scope of § 101, and permits patent-eligibility of some, not all, aspects of internet-implemented applications of block-chain technology. Therefore, federal U.S. law allows a patent to be granted for many, but not all, aspects of internet-implemented applications of block-chain technology.